

Climate Change Adaptation Advisory Committee

Overview for the Massachusetts Legislature on Climate Change Adaptation

Presentation Title: Presentation by the Key Infrastructure and Land Use Subcommittees

Date of Presentation: 3 November 2009

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This presentation is not to be cited as a reference. Its purpose is to foster open and broad discussion of the issues as well as help assure public awareness of the discussions as of the date of the presentation.

CLIMATE CHANGE ADAPTATION

An update to the MA Legislature



KEY INFRASTRUCTURE

November 3, 2009

Sandy Taft, National Grid
Ray Jack, Mass Water Works Association

CLIMATE CHANGE

- **Mitigation:**

Efforts taken to reduce greenhouse gas emissions.

- **Adaptation:**

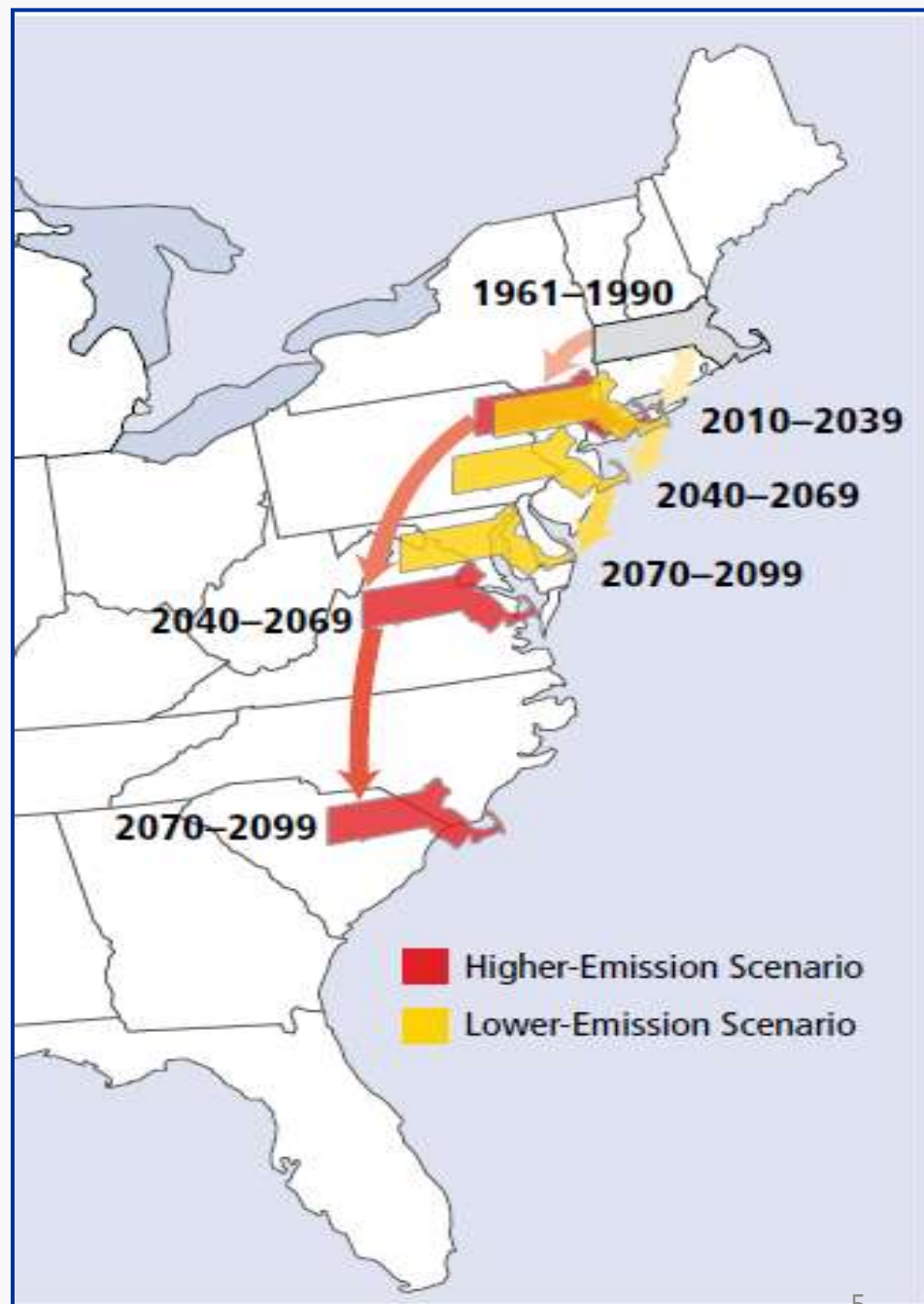
Efforts taken to prepare for a climate that will be different in the future.

PREDICTED NORTHEAST CLIMATE CHANGE IMPACTS

Parameter	Current (1961-1990)	Predicted Range by 2100
Temperature °C(° F)	7.8 (46)	10 (50) to 13 (55)
Precipitation (inches)	40.5	43 to 46
Sea level rise (inches)	3.1	10 to 35
Streamflow-spring peak flow (days)	84.5	80 to 72
Short Droughts (#/30 yr)	12.61	16 to 23
Snow Days/Month (days)	5.2	4 to 1
Length of growing season (days)	184	196 to 227

CHANGES IN AVERAGE SUMMER HEAT INDEX

How hot will it
feel?



KEY INFRASTRUCTURE SECTORS

Subcommittee Co-Chairs: Ed Kunce, MassDEP; Ron Killian, MassDOT

- 1. Energy (electric, gas, petroleum)**
- 2. Transportation (land, sea, air)**
- 3. Water (supply, wastewater, stormwater)**
- 4. Safety and Flood Control**
- 5. Solid and Hazardous Waste**
- 6. Buildings and Structures**
- 7. Emergency Preparedness**

SECTOR PARTICIPANTS

Energy

- MA DOER
- National Grid
- Northeast Utilities
- Nstar
- Northeast Gas Association
- New England Power Generators Association

Transportation

- MassDOT
- MBTA
- Massport

SECTOR PARTICIPANTS (Cont'd)

Water

- MADEP
- MWRA
- MWWA
- CRWA
- USGS
- VHB

Safety & Flood Control

- MADEP
- MCZM
- DCR
- MEMA

SECTOR PARTICIPANTS (Cont'd)

Buildings

- MADEP
- MassDOT
- DCAM
- DCR
- MEMA

Waste

- MADEP
- MCZM

SECTOR PARTICIPANTS (Cont'd)

Cross-sector

- Harvard
- Tufts
- EOEEA
- USEPA
- USGS
- MEMA
- N. Middlesex Council of Govt
- Salem State
- NESCAUM
- BRA
- AECOM
- VHB

PUTTING IT IN PERSPECTIVE

Energy:

- 170 generating units supply part of MA demand for 57 million MWh/year
- Six Major oil facilities along the MA coast
- 44% of MA home fuel from natural gas through 22,000 miles of pipelines

Transport:

- 71,000 lane miles of roads and 4960 bridges
- MBTA system serves 1.2M riders/day for 175 cities & towns
- Amtrak carries 2.8M riders/year with 300 weekday trains in MA
- Logan Airport handles 400,000 flights and 26M passengers/year
- 51 other public and private airports in MA
- Island ferries carry 2.7M passengers, 452K cars, and 143K trucks/year
- Rail is primary transport in MA for over \$307B in commodity value

Water:

- 531 public water supply systems and 550,000 private wells
- 70% MA residents use 115 public sewage treatment facilities

Flood Control:

- 2882 known dams, mostly private-owned; 1229 are not regulated

EXAMPLES OF POTENTIAL VULNERABILITIES

- **Temperature Increases**
 - Increased warm weather energy demand resulting in heat-stressed electrical equipment
 - Public water supply affected due to increased irrigation demand
 - Aircraft performance deteriorates, longer runways required
- **Precipitation (increase and greater intensity)**
 - Increased loads to wastewater and stormwater systems result in combined sewer overflows
 - Localized flooding, e.g., Lowell MA – gas system outages
 - Decreased water supply in summer months

MOTHER'S DAY STORM - 2006



MOTHER'S DAY STORM - 2006



EXAMPLES OF POTENTIAL VULNERABILITIES

- **Sea Level Rise (SLR) and Flooding**
 - With extensive coastal and riverine areas. Many MA infrastructures are at risk from flooding, storm surge and saltwater intrusion. These include:

Airports and marine terminals; electrical, gas, and communications infrastructure; roads, tunnels, bridges; water supply, wastewater, and stormwater
- **Extreme Weather Events**
 - High winds, hurricanes, storm surges, and waves can damage energy infrastructure, ports, and buildings
 - Gulf Coast events could affect natural gas supply transmission in MA
 - Reduced emergency response capacity and public safety hazards

ICE STORM - 2009



POTENTIAL STRATEGIES

- “No-regrets” strategies
- Common strategies
- Education, Outreach and Technical Assistance (EOT&A)
- Sector-Specific

EXAMPLES OF “NO-REGRETS” STRATEGIES

- Better preparation just makes sense
- Conservation, efficiency, reduction, and reuse strategies
- Integrate adaptation strategies into near-term, planned asset upgrades and O&M
- Maximize use of natural systems, e.g., watersheds, wetlands, coastal features
- Can be pursued by all sectors

EXAMPLES OF COMMON STRATEGIES

- Revise regulatory, design, and code requirements - “Protect” versus “Retreat”
- Update asset inventories with accurate survey and hazard mapping that accounts for future climate conditions (LiDAR and updated floodplain maps)
- Develop risk-based, probabilistic methods to evaluate infrastructure life risks
- Increase financial support for adaptation programs
- Enhance regional approach and coordination
- Highlight energy and transportation systems as critical elements to all sectors
- Decentralize some infrastructure elements, decrease their use, and increase their efficiency, to maximize adaptive and national security objectives
- Use “Clean State Model” to manage and coordinate progress across all sectors

EDUCATION, OUTREACH and TECHNICAL ASSISTANCE (EOT&A)

- Develop “sector-specific” EOT&A
- Emphasize municipal EOT&A
- Target decision-makers with focused EOT&A
- Strengthen general public EOT&A strategy
- Designate a lead agency to manage and coordinate EOT&A

SECTOR-SPECIFIC POTENTIAL STRATEGIES

- Emergency Planning
- Energy
- Transportation
- Water
- Dam Safety & Flood Control
- Solid & Hazardous Waste
- Buildings & Built Infrastructure

EMERGENCY PLANNING

- Update and integrate key infrastructure asset inventories and “risk” mapping and prioritize risk
- Incorporate climate change impacts into State Comprehensive Emergency Management Plan
- Assess capacity at state and local level to respond to and recover from expected climate change impacts
- Expand capacity to respond and recover
- Expand scope of State Hazard Mitigation Plan
- Education and outreach on cost benefits of “pay me now” vs. “pay me more later”

ENERGY (electric, gas, petroleum)

- Prioritize and begin near-term adaptation strategies for assets in high risk areas
- Develop enhanced design and performance standards for new and major modifications to systems in high risk areas
- Utilize new technologies to provide resiliency and reliability in existing systems, e.g. “Smart Grid”



TRANSPORTATION (land, sea, air)

- Develop new design standards and encourage innovation
- Begin implementation of near-term enhancements
- Adjust O&M programs to integrate adaptation strategies while maintaining existing infrastructure
- Begin work on planning for longer term strategies
- Regional “cross-fertilization” on adaptation strategies



WATER (supply, wastewater, stormwater)

- Enhance Natural Systems
- Treat Water as a Commodity Increase Conservation and Reuse Effort
- Offset Impacts to Water Supplies
- Make Near-Term Changes to Publicly Owned Treatment Works
- Address Stormwater Flows
- Enhance the State Revolving Fund Program



DAM SAFETY and FLOOD CONTROL

- Update extreme weather events predictions and models used in design and safety analyses
- Prepare and/or revise emergency action plans, with public/private coordination
- Work with private owners and insurance providers on insurance programs to cover liability for dam risks
- Institute analysis to determine which dams could and should be removed



SOLID and HAZARDOUS WASTE

- Identify facilities in high risk areas
- Revise regulatory requirements to address adaptation needs in high risk areas
 - siting requirements for new and expanded facilities
 - enhance EP/ER requirements
 - new design performance standards, e.g., at landfills
- Debris Management Plan



BUILDINGS and BUILT INFRASTRUCTURE

- **Develop near-term guidance for existing assets in high risk areas**
- **Require adaptation considerations for all new public structures**
- **Reviews and permits for private developments in high risk areas should address adaptation needs**
- **Continually review and modify universal design requirements based on climate change impacts**

SUMMARY

Key Infrastructure Adaptation

- Protection and reliability of Key Infrastructure are essential for public health and safety, and economic and national security
- Success involves regional coordination, focus on flexibility/resiliency, and long-range financial planning

Thank you



Questions?

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LAND USE

Marc Draisen, Executive Director
Metropolitan Area Planning Council (MAPC)



NEW DEVELOPMENT

- Size infrastructure to handle predicted storm events
- Ensure that state investments in infrastructure and development projects reflect climate change concerns, especially future risk
- Use state statutes/regulations to limit construction of new “at risk” buildings and infrastructure
- Site/design development to preserve/restore natural hydrology & restore/create flood storage

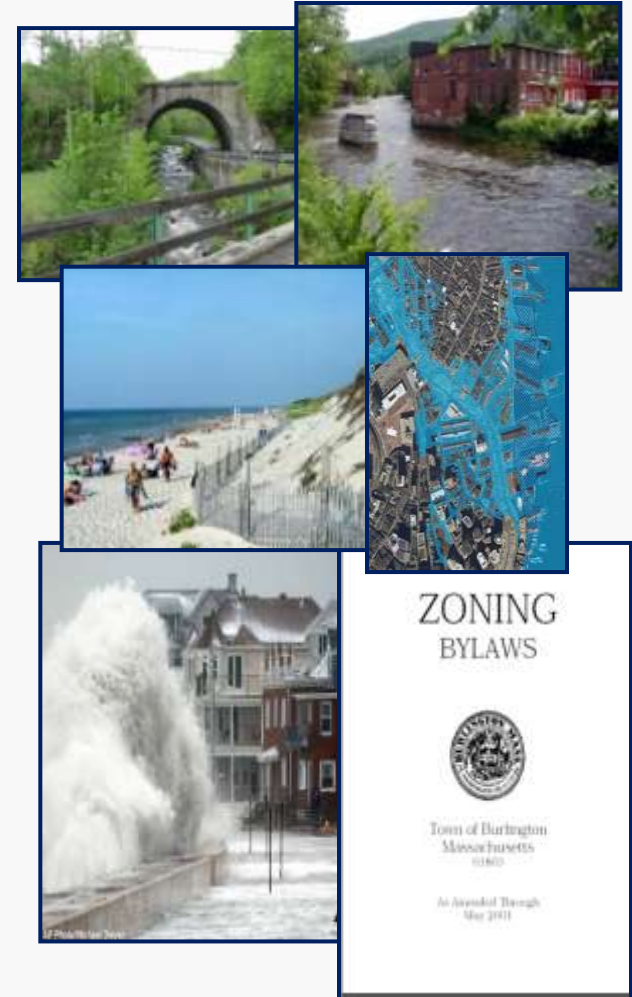


Low Impact
Development



EXISTING DEVELOPMENT

- Ensure that as sea level rises “at risk” buildings and infrastructure are structurally prepared for storm events
- Produce a plan that classifies coastal areas by “tier” based on degree of risk, extent of existing development and corresponding investment, sensitivity of natural resources, and other factors
- Develop and implement a protocol for each tier that applies appropriate state and local planning, regulatory, infrastructure, investment, and other tools such as incentives



PLANNING, REGULATIONS, and ASSISTANCE

- Assign an agency responsibility to serve as an information center as well as policy advisor on climate change and adaptation strategies in order to coordinate plans, regulations, and investments
- Work with Regional Planning Agencies to gather and disseminate data and technical assistance to municipalities.
- Ensure that state, regional, local, and other land conservation and development plans reflect future climate change risk projections



PLANNING, REGULATIONS, and ASSISTANCE (cont'd)

- Incorporate evaluation of climate change impacts in MEPA and other permitting processes
- Invest land conservation funds to minimize climate change impacts and support adaptation
- Utilize local regulations to minimize the impact of climate change
- Utilize local land use regulations and state building code to limit the heat island effect



Thank you



Questions?

